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Koranic Schools in Senegal:

An actual barrier to formal education?

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ABSTRACT

In Sahelian countries, non-religious public education systems prevent the inclusion of religious teaching in public schools, which is relegated to the informal sector. This article is a first attempt to quantitatively study how this dual educational system works and whether the potential competition between both systems is a key factor for low primary school enrollment in Senegal. The analysis is based on a unique national dataset with detailed information on formal and Koranic schooling of 5 to 21 year-old children covering 1800 households. In our sample, over half of the girls and 60% of the boys attend Koranic school, but the majority only for 2 or 3 years. After giving a brief background on Islam and Koranic schools in Senegal, to better grasp the complexity of the subject, we study the determinants of Koranic schooling before analyzing its compatibility with formal schooling. A descriptive analysis shows that children who attended for a few years Koranic school have a higher probability of attending formal primary school than those who haven't been to Koranic school at all and those who attended higher Koranic studies. However, this apparent complementarity vanishes and even in some cases turns into significant substitutability after duly instrumenting formal school attendance with school openings. This tends to prove that the coordination between the acquisition of formal human capital and religious knowledge is one of the challenges faced by Senegal in achieving Millennium Development Goals.

Keywords: Koranic Schools, School demand, Senegal

JEL Classification: D12, I28, O12

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Introduction

In mainly Muslim Sahelian countries, non-religious public education systems prevent the inclusion of religious teaching in public schools, relegating it to the informal sector. Those countries display among the lowest primary school enrollments in the world and have informal Koranic schools. After reviewing the specificity of Islam in Senegal as well as the functioning of Koranic schools, this paper studies the duality of the Senegalese education system, and assesses whether this duality is a relevant explanation for the low primary school enrollments.

Islam in Senegal

Muslims represent 94%[1] of the Senegalese population. Coming from North-Africa in the 10th century, Islam was rather, in the beginning, the religion of the elite along the trans-Saharan trading routes[2]. Massive conversions took place in the 19th century through all layers of society to fuel the army of "Jihads" against the European colonizers and non-Muslim states[3].

Most Senegalese Muslims (90%) are members of Sufi brotherhoods (known in Arabic as "tariqah", "confrérie" in French). Sufi represents a mystic branch of Islam: followers seek the ultimate truth through spiritual practices and asceticism. A master ("marabout" in Senegalese French, "shaykh" in both Arabic and Wolof) teaches his method ("tariqah" means "way", "path") to his disciple. This master-disciple relationship is common to all Sufi brotherhoods, but the type of this relationship and its intensity depends on the brotherhood. There are four main Islamic brotherhoods in Senegal: Tijanyyah (50%), Muridiyyah (30%), Qadiriyyah (10%) and finally the Layene brotherhood which represents a minority[4] very concentrated around Yoff, a suburb of Dakar. The figures given here are rough estimates as there are no official sources, and it is highly instrumented as each brotherhood claims to have many disciples. There is a consensus however that Tijanes and Murids are the two main ones, with a slight numerical advantage for the Tijanes.

[1] Source: CIA - The World Factbook: https://www.cia.gov/library/publications/the-world-factbook/geos/sg.html
[2] See for instance Robinson (2004).
[3] Led by El Hadj Umar Tall, cf. Robinson (1985).
[4] This brotherhood can mainly be found among the small Lebu ethnic group who are Wolof-speaking fishermen.

Both Tijanyyah and Qadiriyyah were imported by pilgrims earlier and spread throughout the region. The Tijanyyah originates from Algeria in the 18th century, and came to Senegal in the early 19th century. Originally introduced by the Haalpulaar[5], who brought it to neighboring regions, it was rapidly controlled by the Wolof[6]. This explains its dominance as they are the two main ethnic groups. The Qadiriyyah is known to be the most orthodox one, and represents nowadays only a small fraction of the Muslims, mainly in the South. On the opposite, Muridism and the Layene brotherhood are strictly Senegalese brotherhoods.

Muridism[7] is deeply embedded in Wolof society. Originally a rural movement from the Baol region[8], it spread throughout the urban centers. Though believed to be second in size, they are the most active, particularly successful in attracting the urban youth[9]. Nowadays, portraits of their founder can be found all over the walls of Dakar. The attractiveness of this brotherhood seems to be due to how well it adapted to the local social context. Sy (1980) mentions that in the 19th century, Muridism appeared as a reaction towards both colonial influence and the hierarchical Wolof society[10]. By attracting at first mainly the low-status slaves, castés, and poor peasants, it responded to an aspiration to a more egalitarian society. In the end, the privileged ties between the master and his disciples somehow replaced the submission to former masters. The disciple pledges allegiance to a master: "I submit myself to you with my body and soul"[11]. Another specificity of the brotherhood is to place work for the master at the center: in the country side, the disciples would work once a week on the shaykh's field[12]. The first Murid migrants arriving to Dakar felt the need to gather as they were still a minority in a Tijane environment[13]. Some reorganization took place, replacing disciple's work by monetary support. Tuba, their holy center, is an impressive illustration of the economic success of the brotherhood: the modern city rose in the middle of the peanut fields. It was developed by remittances from

[5] More commonly known as "Toucouleurs" or "Tukulors".
[6] Its capital is in Tivaouane, in Thiès Region.
[7] Founded in 1885 by Cheikh Ahmadou Bamba
[8] It is located around Kaloack and refers to a former Wolof state.
[9] As already noted in Diop (1981) this clear strategy announces the hegemony of the brotherhood.
[10] Indeed as in many ethnic groups of the region, the traditional society is divided into "free-men" (sometimes confusingly called "nobles"), "castés" (craftsmen, musicians) and former slaves.
[11] Cf. Cruise O'Brien (1970). The ceremony of obedience is perceived by Tijanes as heretic as it implies that the master has divine power. Indeed there exists a great competition between the two main brotherhoods.
[12] Unique among Muslims, a sub-group of Murids called Baye Fall, are even exempted from their 5 daily prayers, as working on their master's field is their way to worship God.
[13] Cf. Diop (1980).

disciples all around the world and is now the second agglomeration in Senegal, with more than 450 000 inhabitants in 2002[14].

The country is renowned for its tolerant Islam, though recently, a new Islamist movement locally known as "Ibadou"[15] has been spreading throughout the urban elite. Their success can be easily measured by the growing number of veiled young university women. As far as we know, no reliable source gives precise idea of the importance of the phenomenon[16].

Islamic schools in Senegal

As in many other Muslim countries, public schools offer none or few religious education[17], so children are sent to (informal) Koranic school. Given the specificity of the practice of Islam in this region, we give now a short presentation of Koranic schools in Senegal. Often only perceived as an institution that put children in the streets begging, Koranic school encompasses in fact a broader reality.

It is also very difficult to have reliable data on Koranic schools in Senegal. In reality, there exists a great variety of forms too, from informal village schools to more formal Franco-Arab schools. There is no rigid structure of informal Koranic schools in Senegal as elsewhere in the region, but three levels can be distinguished[18]:

- The primary level: once children are able to speak, typically between 3 and 5, they are often sent to Koranic school where they are taught basic knowledge of Koran.
- The secondary level: then, among those who have memorized large portions of the Koran, some of children are taught "Islamic science", i.e. translating the holy book, the written traditions of the religion

[14] According to the Population census
[15] "Ibadou Rahmane" means "the servants of the Merciful".
[16] Villaleon (2004) cites a sociologic study estimating between 5 and 10% the proportion of veiled women on university campuses.
[17] Though there are recently some attempts to include Koranic studies in the curriculum, cf. Charlier (2002), if is not yet the case that both systems are integrated. Some (private) schools called "Franco-Arab" schools do present both programs. We will come back to this point later on.
[18] Following World Bank (1999).

- Higher studies: a few selected students will proceed beyond this level usually with famous masters and often in famous Islamic university in North Africa or other Muslim countries[19].

Of course this description is rather subjective, e.g., Gandolfi (2003) differentiates five levels sub-dividing the first two levels mentioned earlier in two sub-levels. However this structure appears to be very similar in many Muslim Sub-Saharan regions.

The first two levels (denoted here as primary and secondary level) are locally known as "écoles coraniques" in French, "daara" in Wolof. This elementary teaching begins with learning by heart the Koran without understanding it, so that one may wonder which skills are transmitted. Though they are taught to read and write Koranic verses, alumni rarely master Arabic language. The ultimate aim of this school is to prepare the student to become a good Muslim[20]. The main values transmitted are obedience, respect, and submission. Pedagogy's strategies may include physical punishments and often begging for food, which allows students to experience humility and solidarity, both highly valued in Sufi Islam[21].

In the same spirit, it is also believed that children would learn more being away from their parents, who would not interfere with the master's strict discipline[22]. In this case, as traditional Koranic schools are usually tuition-free and provided Koranic masters cannot afford to feed all his students, they would be fed by the neighbors[23]. It is indeed a common practice that some families are informally assigned to feed some Koranic students. In some areas (and downtown Dakar especially) it is very common to see Koranic students begging for food at red lights.

The practice of child fosterage is widespread in West-Africa. It is nevertheless very difficult to get precise estimates of the number of children fostered by Koranic masters. Children's rights advocates tend to instrument these figures to alarm public opinion and officials, since children fostered to the Koranic master are often in a very deprived situation. Perry (2004) analyses the

[19] Gandolfi (2003) mentions Cairo, The Mecca, Fez, etc.
[20] "A believer, a perfect man" in Gandolfi (2003)'s words.
[21] As it is certainly not always the case, the violence exerted on the Koranic students by their master is somehow tolerated as part of the normal treatment cf. Sy (1980) and the first pages in Kane's "Ambiguous Adventure" famous novel
[22] See Perry (2004).
[23] Food given to talibes is believed to be mandatory charity for Muslims.

discrepancy between their discourse and the experience of the local population[24]. The media's focus is often on the urban "talibés" (Koranic school students in Wolof[25]) begging in the streets of business districts or touristic areas with tin cans, dressed in rags and in poor health conditions. Accounts of Koranic masters exploiting his talibes by forcing them to collect a certain amount per day with the threat of physical punishments are often echoed in the local press and internet[26]. Former talibes who have fled from their harsh masters often become street children. UNICEF estimates that 100,000 children are begging in Senegal[27] and *Understanding Children's Work*[28] (2007) estimates that 90% of begging children in Senegal are talibes.

However, children fostered by Koranic masters represent only a minority of Koranic students in Senegal. Many primary school students attend simultaneously Koranic school either after school or during vacations. Usually they will only learn basic knowledge to be able to recite the prayers[29].

As traditional Koranic schools don't have any precise timetable or curricula as the formal education system does, there is no guaranty of the quality of the teaching, but there have been attempts to modernize them. The most significant one has been the development of Franco-Arab schools ("école franco-arabe" similar to "madrasa" in other contexts) since 1950's with a recent growth in the 2000's[30], trying to reconcile formal and religious schooling. Franco-Arab schools are excluded from this paper, and considered as formal education. Indeed, in some Franco-Arab schools, pupils take the same exams as in public formal schools, so those schools are undoubtedly formal ones.

[24] Her work is based on a small-scale study among rural Wolof Tijane.
[25] Even though, there is a confusion, as it rather refers to disciple in the broad sense, and therefore any Murid follower
[26] One example could be: http://www.irinnews.org/report.aspx?reportid=50001
[27] http://www.unicef.org/protection/senegal_34961.html
[28] Inter-Agency Research Cooperation Project on child labor implying ILO, UNICEF and World Bank.
[29] Gandolfi (2003)
[30] Ibid.

In Dakar, many pre-school Islamic institutions have emerged, providing an alternative to traditional Koranic schools. The biggest difference between both systems is that these modern institutions have relatively high fees[31].

Is there any competition with (formal) primary schools?

Senegal is part of the *Education For All* (EFA) UN Programme, targeting universal primary education, which is part of the Millennium Development Goals. Universal primary education is far from being achieved with 70% of primary school gross enrollment rate in 2002[32]. If supply-side issues are certainly a key barrier for access to education, demand-side issues are also believed to play an important role. When benefits from formal schooling are not perceived by uneducated parents, the motivation to send children to school is low. On the contrary, sending children to Koranic school may be the result of higher perceived returns. The economic success of the Murids for instance makes Koranic schooling more attractive and potentially useful to benefit from the brotherhood's powerful network in the informal sector[33] and in illegal migration channels[34]. In addition, some Senegalese consider the public system of formal education as a heritage of colonization, and by contrast, Koranic school as closer to Senegalese traditions[35]. As mentioned earlier though, it may not necessarily be the case that both systems are in competition, since many children are sent to Koranic school after their (formal) schooldays (and week-ends and vacations). Hence both types of educations are theoretically compatible.

Despite their pervasive influence in contemporary Senegal, Koranic schools have been neglected by development planners. This article is to our knowledge the first attempt to study quantitatively links between the two types of schooling and the potential substitutabilities or complementarities thanks to a unique data set on education with information on Koranic (and formal) schooling in Senegal. As there are many similarities in Koranic schooling throughout

[31] Gandolfi (2003) mentions up to 1000Fcfa a month in Dakar.
[32] According to UNESCO-UIS website:
http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF_Language=eng&BR_Country=6860&BR_Region=40540
[33] World bank (1999)
[34] See for instance Lacomba (2000).
[35] See in particular Huet-Gueye and de Leonardis (2007) for a lexical and morphosyntactical analysis of parents' social representations in the light of schooling choices for their children. Traditionalist vs. modernist views clearly shapes Koranic vs. formal schooling choices.

other Sahelian countries where low primary school enrollments are encountered, to some extend conclusions drawn from this national survey could give some clues about the mechanisms at play in the neighboring countries as well.

The following section will first present our dataset and then some descriptive statistics on Koranic school enrollment. After studying the determinants of Koranic education, we will present our empirical strategy to study the possible links between Koranic and formal schooling. Results and policy implications will conclude.

Data and descriptive statistics on Koranic schooling

The dataset

In this paper, we use the EBMS[36] dataset. It is a national household survey conducted in Senegal in 2003 on 1800 households. The data collected contains detailed information on the schooling trajectory of the household members and their relatives (parents, siblings and children), as well as on their living conditions: possession of durable goods, employment status, health, etc. It also includes unique (to our knowledge) information on Koranic schooling. For each household member aged between 5 and 21, we know whether they have been enrolled in Koranic school and the duration of their study.

The EBMS survey design was aimed at resurveying some of the pupils that passed school attainment tests during the pre-existent PASEC Senegal survey[37]. In PASEC survey, 20 pupils were randomly chosen among second grade pupils from 99 primary schools in 1995. 60 schools surveyed by PASEC were resurveyed in EBMS. In each of these schools, the maximum numbers of households containing at least a PASEC child (up to 20) were surveyed. Other households belonging to the community of the school (village or neighborhood in urban areas) were surveyed, so that the total number of households in each community would reach 30.

This particular sampling design has some consequences for inferences issues. First, there is a school at least since 1995 in each community surveyed. As a result, we observe Koranic school attendance provided formal school attendance is also possible. This tends to underrepresent remote areas where there are no primary schools or only recently. Second, some households are in our sample because they enrolled a child in second grade during school year 1995 - 96. Consequently, recently composed households are probably underrepresented in our sample. Households with very low preferences for formal schooling may also be underrepresented.

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[36] EBMS is a survey on households' education and well-being in Senegal: "Education et Bien-être des Ménages au Sénégal".

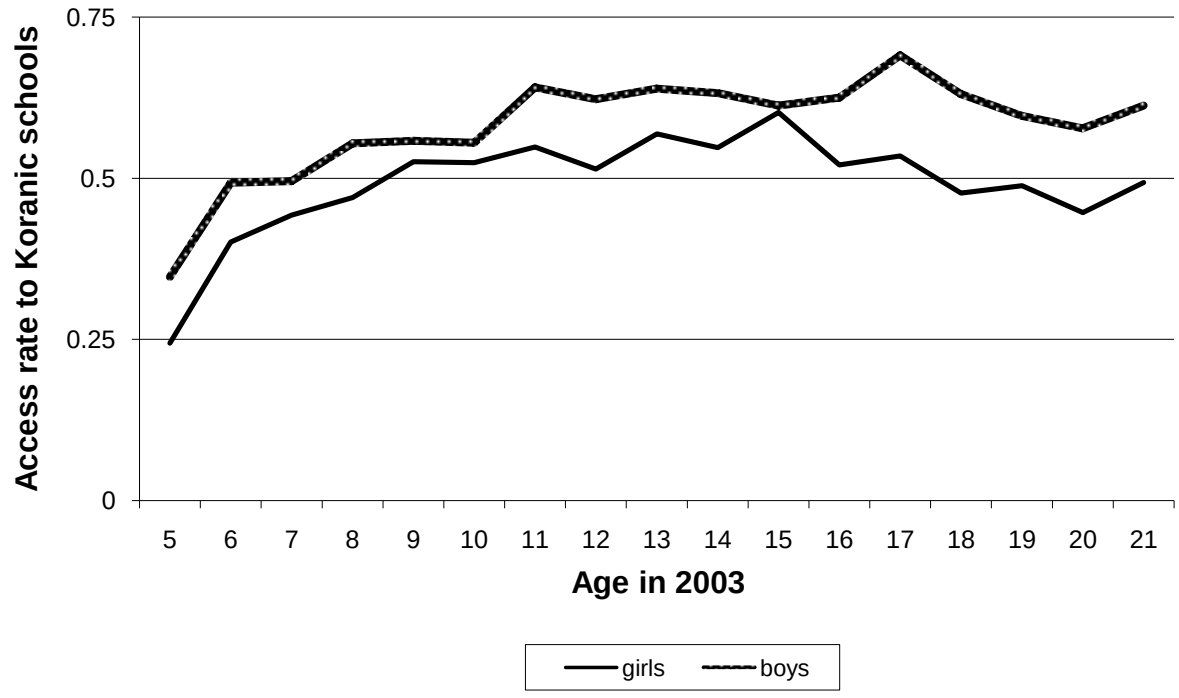
[37] PASEC is the Program of Analysis of Education System: "Programme d'Analyse des Systèmes Educatifs de la CONFEMEN" (created in 1991 after Jomtien Conference on *Education for All*) where CONFEMEN is the oldest organization of the Francophonie: "Conférence des Ministres de l'Education ayant le français en partage" from 1960. PASEC conducted a panel survey in Senegalese primary schools between 1995 and 2000. This panel included notably school attainment tests. For further information on the PASEC Programme, see http://www.confemen.org/

In this section, we give some descriptive statistics about Koranic school enrollment in our sample, and then study its determinants.

Age when enrolled in Koranic school

In Figure 1, we plot the proportion of children having attended Koranic school in our dataset and their age. In reality, there are two effects that can explain the differences between the enrollment rates of the older and the younger cohorts. First, in the older cohort, the proportion of children who have not yet attended Koranic school but will attend Koranic school in the future is smaller. Second, if the Koranic school attendance decreases (or increases) with time, this affects the difference of Koranic school attendance between the 2 cohorts. With data at hand, the two mechanisms are theoretically unidentifiable. However, we observe that until the age of 11, boy enrollment rate increases rapidly with age, and that it increases rapidly until the age of 9 for girls. For that reason, we will suppose that above those ages, the differences in Koranic school enrollments are not due to future enrollment.

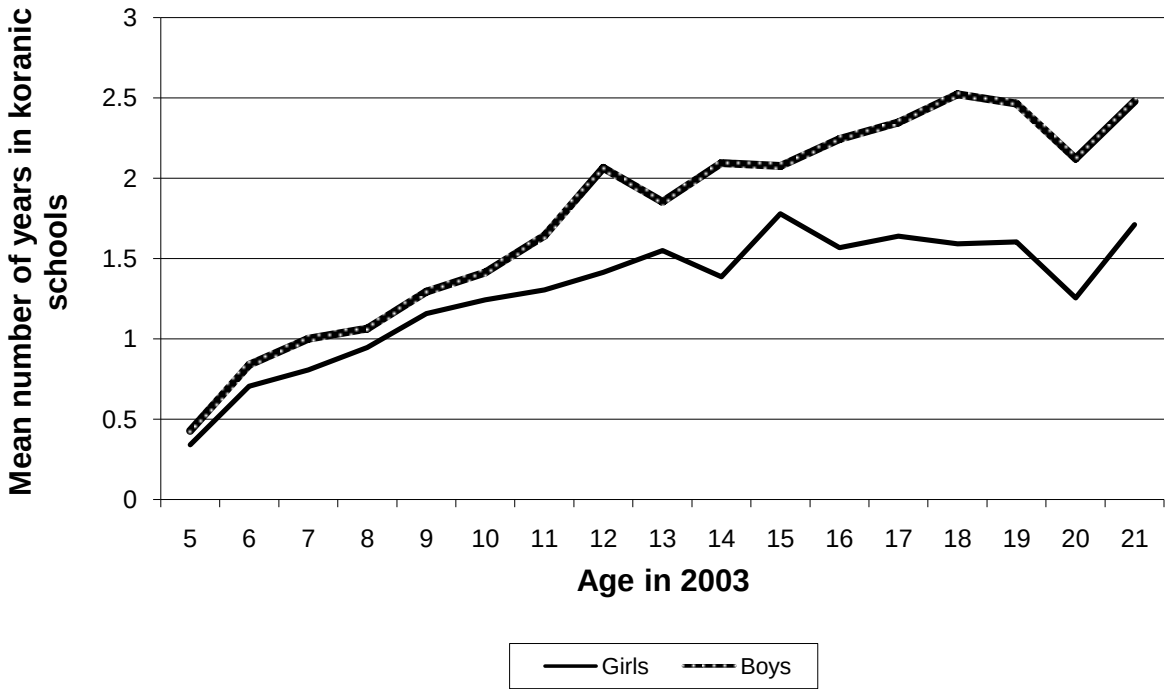
Figure 1: Koranic school enrollment by age in 2003



In Figure 2 below, we plot the average duration of Koranic schooling against age in 2003. In that case, the number of years spent in Koranic school does not increase after 18 years for the boys,

and 15 years for the girls. For that reason, we will make the following assumption: girls older than 15 and boys older than 18 have finished their Koranic schooling.

Figure 2: Schooling duration in Koranic school and age in 2003



Koranic school duration

In We observe that approximately half of the girls and 40% of the boys do not attend Koranic school. Among those who have attended Koranic school, the majority attends 2 or 3 years. Only 15% of the girls and 27% of the boys attend Koranic school for more than 3 years.

Table 1 below, we give the distribution among girls and boys of Koranic schooling duration. The distributions are computed among the individuals whose age ensures that Koranic schooling is over. For this reason, there are more girls than boys in the sample.

We observe that approximately half of the girls and 40% of the boys do not attend Koranic school. Among those who have attended Koranic school, the majority attends 2 or 3 years. Only 15% of the girls and 27% of the boys attend Koranic school for more than 3 years.

Table 1: Number of years in Koranic school for boys and girls

Nb. of years in Koranic school	Girls (above 15 y. o.)	Boys (above 17 y. o.)
0	49,1%	40,3%
1	8,9%	6,9%
2	15,8%	14,5%
3	10,4%	11,0%
4	5,5%	7,2%
5	5,1%	7,8%
6	1,7%	3,8%
7	1,0%	1,9%
8 or more	2,4%	6,5%
Nb. of obs.	1752	780

Determinants of Koranic schooling

In Table 2, we estimate two different models for the determinants of Koranic school attendance. In columns 1 and 2, we estimate two specifications of a probit model for the determinants of having ever attended a Koranic school. In columns 3 and 4, we estimate the determinants of the number of years in Koranic school with OLS. We include in the sample all girls aged 15 or more, as we observed in Figure 2 that girls older than 15 have probably finished their Koranic schooling. In Table 3, we run the same regressions for boys, above 18 years old, as according to previous observations, they have probably finished their Koranic schooling.

We observe that Koranic school attendance is lower for older girls: this means that the younger cohorts are more likely to attend Koranic school. This is probably due to a time trend in the Koranic school attendance, although we do not observe a similar time trend for boys.

Unexpectedly, controlling for other variables, we do not observe any difference in the Koranic schooling between urban and rural areas, neither for girls nor for boys. However, it may well be the case that it is captured by the wealth variable.

Wealth is associated with a higher propensity to spend time in Koranic school. For girls, it is associated with a higher probability of having ever attended Koranic school and for a higher number of years spent in Koranic school. For boys, the coefficients for the probability of ever

attending Koranic school are not significant. However, wealth is also associated with a higher average number of years spent in Koranic school. Hence, it seems that sending girls to Koranic school is a "luxury" that rich households only can afford. Indeed, in poorer households girls are more likely to be employed in heavy domestic chores which prevent them from attending school whether it is formal or Koranic. According to Dumas and Lambert (2006) domestic chores are generally the main type of child labor and it mostly concerns girls. At the same time, domestic chores vary greatly with household's equipment: Moguerou (2006) shows for instance that in households equipped with water access children and in particular girls are more likely to go to school. On the opposite, boys from any economic background are sent to Koranic schools, even though it seems that rich ones only can afford to pursue longer studies.

The (formal) education of the parents is not strongly associated with Koranic schooling. For boys, the father's education is associated with a lower average duration of Koranic schooling.

Koranic schooling is shorter for girls when the father works in the formal sector, but not for boys.

The ethnic group is a strong determinant of Koranic schooling. The main ethnic group in Senegal, Wolof, taken as a reference, two ethnic groups attend significantly less Koranic school: Sérère and Dioola. The average number of years being between 0.5 and 1 year lower for girls (average: 1.6 years of schooling) and between 0.8 and 1.4 years lower for boys (average: 2.4 years of schooling). One ethnic group attends more Koranic school for both boys and girls, Soninké, and another for boys only, "Pulaar"[38] . Regressing the number of years spent in Koranic school on ethnic groups explains 7.9% of the variance for boys and 4.6% for girls, whereas regressing last grade attended on ethnic groups explains 1.4% of the variance for boys and 2.9% for girls. Ethnicity explains a larger part of the variance in Koranic school attendance than in formal school attendance. This underlies the fact that culture is probably a strong determinant of Koranic schooling. Although, there may be interferences with religious brotherhood effects as well, since ethnic group and brotherhood affiliation are related as explained in the first section.

[38] Fulbe ("Peuls" in French) and Haalpulaar ("Toucouleurs") are grouped together.

The rank among siblings is another determinant of Koranic school attendance. However, there are information about siblings only if the mother (or father) lives in the surveyed household. For this reason, the sample is smaller once the number of siblings and the rank among siblings are introduced. We observe that sharing siblings with the same mother has an effect on the Koranic education of girls, and that having siblings with the same father affect the Koranic education of boys[39]. For that reason, we include the relevant variable in Table 2 and 3.

Older sisters have a higher Koranic school attendance, and longer Koranic school duration, whereas older brothers have a lower Koranic school attendance. Surprisingly, attendance is lower in small brotherhood for boys. The number of older sisters decreases the probability of attending Koranic school for boys. Koranic school duration is positively affected by the number of siblings for girls, while it is negatively affected by the number of older brothers for boys.

[39] Because of polygamy and frequent divorces, the correlation between the number of siblings with the same father and with the same mother is only 0.5 in our sample. For that reason, "sibling with the same mother" and "sibling with the same father" are not identical.

Table 2: The determinants of Koranic school attendance for girls

	Has ever attended Koranic school (probit model)		Number of years in Koranic school (OLS)	
Age	-0.063	-0.058	-0.051	-0.075
	(0.016)**	(0.017)**	(0.028)+	(0.028)**
Rural	-0.220	-0.146	-0.159	-0.070
	(0.138)	(0.154)	(0.225)	(0.235)
Wealth (Possession of durable goods)	0.177	0.277	0.257	0.514
	(0.055)**	(0.063)**	(0.087)**	(0.115)**
Father's Education	0.031	0.052	0.005	0.025
	(0.028)	(0.031)+	(0.051)	(0.067)
Mother's Education	0.045	0.017	0.062	0.011
	(0.028)	(0.034)	(0.062)	(0.064)
The hh's head works in the formal sector	-0.088	-0.245	-0.338	-0.464
	(0.090)	(0.109)*	(0.134)*	(0.159)**
The household's head is farmer	0.107	0.072	0.085	0.158
	(0.124)	(0.165)	(0.224)	(0.240)
Ethnic group : Pulaar	0.080	0.266	0.108	0.419
	(0.132)	(0.158)+	(0.255)	(0.298)
Ethnic group : Serere	-0.482	-0.268	-0.784	-0.449
	(0.157)**	(0.165)	(0.212)**	(0.225)+
Ethnic group : Dioola	-0.673	-0.598	-0.973	-0.636
	(0.216)**	(0.294)*	(0.252)**	(0.343)+
Ethnic group : Mandingue	0.047	0.187	0.161	0.266
	(0.223)	(0.218)	(0.360)	(0.318)
Ethnic group : Soninke	0.657	0.555	1.403	1.091
	(0.295)*	(0.287)+	(0.593)*	(0.553)+
Ethnic group : Others	0.010	0.105	0.169	0.305
	(0.207)	(0.224)	(0.396)	(0.434)
Number of siblings (same mother)		0.034		0.092
		(0.023)		(0.040)*
Rank among sisters (same mother)		-0.100		-0.140
		(0.035)**		(0.053)*
Observations	1680	1140	1673	1137
Constant	1.163	0.995	2.602	2.589
	(0.305)**	(0.383)**	(0.508)**	(0.611)**
log-likelihood	-1081.82	-725.83		
R-squared			0.06	0.08

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Table 3: The determinants of Koranic school attendance for boys

	Has ever attended Koranic school (probit model)		Number of years in Koranic school (OLS)	
Age	-0.042	-0.021	-0.080	-0.085
	(0.047)	(0.061)	(0.098)	(0.129)
Rural	-0.125	-0.300	0.279	0.060
	(0.179)	(0.229)	(0.356)	(0.440)
Wealth (Possession of durable goods)	0.106	0.163	0.586	0.723
	(0.073)	(0.118)	(0.182)**	(0.340)*
Father's Education	0.030	-0.010	-0.160	-0.183
	(0.038)	(0.064)	(0.065)*	(0.109)+
Mother's Education	-0.011	-0.080	-0.128	-0.207
	(0.050)	(0.094)	(0.118)	(0.174)
The household's head works in the formal sector	-0.013	-0.033	-0.087	-0.122
	(0.121)	(0.185)	(0.281)	(0.374)
The household's head is farmer	0.019	0.116	-0.043	0.065
	(0.189)	(0.247)	(0.366)	(0.513)
Ethnic group : Pulaar	0.195	0.375	0.867	0.765
	(0.149)	(0.193)+	(0.427)*	(0.494)
Ethnic group : Serere	-0.907	-0.938	-1.377	-1.269
	(0.143)**	(0.202)**	(0.309)**	(0.458)**
Ethnic group : Dioola	-0.501	-0.683	-0.790	-0.809
	(0.181)**	(0.230)**	(0.353)*	(0.455)+
Ethnic group : Mandingue	0.085	0.129	0.283	0.567
	(0.290)	(0.336)	(0.560)	(0.668)
Ethnic group : Soninke	0.315	0.694	0.587	1.886
	(0.324)	(0.409)+	(1.295)	(0.970)+
Ethnic group : Others	0.013	0.724	-0.347	-0.683
	(0.308)	(0.520)	(0.587)	(0.604)
Number of siblings (same father)		0.023		0.072
		(0.027)		(0.068)
Number of brothers (same father)		-0.098		-0.248
		(0.057)+		(0.105)*
Rank among brothers (same father)		0.122		0.023
		(0.056)*		(0.140)
Number of older sisters (same father)		-0.175		-0.132
		(0.044)**		(0.107)
Observations	747	425	746	424
log-likelihood	-454.12	-240.42		
R-squared			0.11	0.14

Robust standard errors in parentheses

+ significant at 10%; * significant at 5%; ** significant at 1%

Koranic and formal schooling

This section questions the articulation between Koranic and formal schools in Senegal. Does the duality of the education system represent a barrier to the universal primary education goal? We want to find out whether parents face a mutually exclusive choice between both education systems. However it is likely that there exists a correlation between both demands for education. Therefore the fact that children attending formal school are more likely to be enrolled in Koranic school as well does not answer the question. The empirical strategy developed here to circumvent the problem of unobservable individual characteristics, is to introduce the supply of formal education. What happens when a school opens in a particular place? The availability of formal schools provides us with a useful proxy for variations in the price of "formal" human capital. If parents sometimes need to make a choice between Koranic and formal education, the expected Koranic enrollment rate could marginally decline. It is the only exogenous shock at hand that could allow us to observe interactions between Koranic and formal schooling. Indeed, to our knowledge, there are no household surveys containing information on the supply of Koranic education, given the informal nature of this system. Our dataset is probably one of the few to contain simultaneously information on formal schooling, Koranic schooling and the supply of formal education in a developing country.

First, we will give the economic intuitions explaining why our results do give an answer to a relevant public policy issue. Second, we describe the correlations between Koranic and formal school outputs, and finally provide the IV results which take causality into account.

Substitution and revenue effects

Let us consider two goods: the formal and Koranic human capitals. In the standard microeconomic model, the Slutsky equation decomposes the cross-price derivatives of the optimal accumulation of human capital function of the prices of goods. It allows us to define whether the Koranic human capital demand will increase or decrease when the price of formal human capital decreases, differentiating between substitution and income effects.

The first term (the derivative of the Hicksian demand) represents the substitution effect. Its economic meaning is as follows. Suppose a formal school opens. If Koranic and formal schools are substitutes, parents will substitute Koranic for formal school, which became less expensive

per "unit of human capital", and as a result, children will be less likely to go to Koranic school. Conversely, if gaining formal human capital adds value to the Koranic human capital -e.g. they are complementary goods- the opening of a formal school will increase Koranic schooling. The substitution effect has an interesting symmetric property[40], i.e. if the opening of e formal school decreases Koranic schooling by substitution, then the opening of a Koranic school will decrease formal schooling.

The other term, called income effect, can also be easily interpreted in our case. Let's suppose that a formal school opens. For children who would have gone to formal school anyways, travel time decreases, so that the time constraint slacks off. As a result, it could induce an increase in the length of Koranic schooling as free time generated can be reallocated to other activities. The income effect however is *not* symmetric under reasonable hypotheses. In other words, the opening of a Koranic school would probably not quantitatively generate the same time re-allocation towards formal school.

Nevertheless, the sign of this effect is almost certainly known. It is positive for normal goods: its consumption increases with income. It is realistic to assume that human capital is not an inferior good, so that the income effect is positive. Inferior goods usually are vital goods such as staples that wealthier consumers prefer to substitute for more expensive and more appealing food. In the Sahelian context it is very likely that human capital is a normal good, making the income effect positive. Time spent in Koranic school is likely to increase as budget constraint is released.

In the end, we observe the sum of both the substitution and the income effects in this article of the decrease of the price of formal school on Koranic schooling. Suppose that the opening of a formal school decreases Koranic schooling. In regards to what was previously described, it implies that the substitution effect dominates and must have been negative as the income effect would have rather increased Koranic schooling. Even so, this doesn't imply that Koranic schooling would have decreased formal schooling. If many children were already attending

[40] This is technically true if the utility function is "sufficiently" differentiable.

Koranic school, the income effect would have allowed them to attend both at the same time. Theoretically, this effect could dominate the substitution effect.[41]

In our case, the relevant public policy question is precisely not to know whether openings of Koranic schools would hinder universal primary schooling. Laws cannot regulate Koranic school as it belongs to the informal sector: it does not seem feasible neither desirable to ban the openings of Koranic schools or to close existing ones. The relevant question is rather to know to which extend it is possible to combine both education systems and whether it prevents formal schooling. If the opening of formal schools decreases Koranic schooling, it means there is substitution between both systems, and that the substitution effect overrides the income effect. This means that parents didn't choose to combine both education systems, which in turns suggests that both systems are hard to combine. Public action in favor of better integration of both systems would consequently promote universal primary schooling.

Correlations between formal and Koranic school attendance

Though, as we mentioned earlier, I.V. regressions are the only ones which would enable us to identify the link between Koranic and formal schooling. Finding out whether there is a correlation between Koranic and formal schooling is of real interest. It gives indeed some insight on the link between both education systems and on their potential common determinants.

[41] On practical grounds however, the opening of a Koranic school could only marginally release the time or budget constraint, so that the income effect may not be significant.

Figure 3: Formal school attendance and time spent in Koranic school for boys and girls

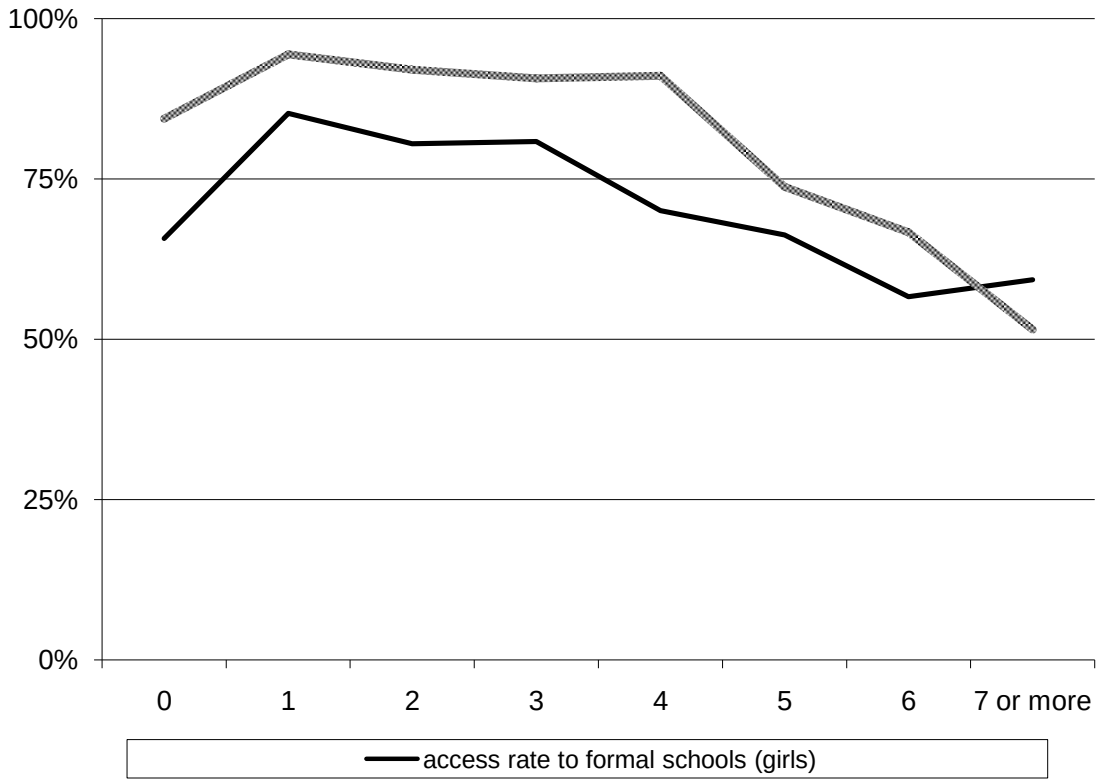


Figure 3 gives the formal school enrollment rates for girls older than 15 and boys older than 18. Both curves display an inverted-U shape. The children who have never been to Koranic school have a lower formal school enrollment rate than those who have been a few years in Koranic school. 66% of the girls with no Koranic education have attended formal school, and 85% of the girls with one year of Koranic education (respectively 84% and 94% for boys). However, if a few years spent in Koranic school do not seem to be a deterrent to formal school enrollment, the proportion of children having attended formal school decreases significantly after 3 years of Koranic schooling for girls and 4 years for boys.

However, Figure 3 does not give any precise information about the effect of Koranic education on formal education. In reality, the demand for Koranic education and the demand for formal education are likely to be highly correlated. A robust result we obtain though is that Koranic and formal education are by far not incompatible.

It is rather impossible to draw any conclusion concerning the causality from this figure. The potential correlation between both systems may blur the picture preventing us from drawing

conclusion on their potential complementarity or substitution. For instance, it could be that some children, notably girls, could be excluded from any schooling system for financial reasons. This would explain why for these children Koranic and formal schooling are correlated. Tables 6 and 7 in the appendix show multinomial logit models, which allows checking whether this inverted U-shape is robust to the inclusion of control variables and it is not the result of omitted ones. However, it remains that a correlation between the demands for Koranic and formal education causes an endogeneity bias in the coefficient of these tables. Only I.V. estimations can give us unbiased results.

Effect of the opening of formal schools on Koranic school attendance

Our instrumental strategy to study the interaction between Koranic and formal schooling relies on the opening of formal schools. The dataset contains detailed information about formal schools, among which the opening year for (nearly) all the (formal) schools in each community. This provides us with a relevant identification strategy: in each community, we compare children who are too old to have benefited from the opening of schools with the younger ones. We expect that in communities where a school opened, the difference in the school enrollments between cohorts is larger than in the rest of the country. This double difference (between cohorts and between communities) allows us to identify the substitution effect between Koranic and formal schools. If whenever a formal school opens affected cohorts are less inclined to go to Koranic school, it would show that it is sometimes costly to simultaneously cumulate both schooling systems.

Before turning to the effects of the openings of formal schools on Koranic schooling, we start by checking that they do affect formal schooling. Estimation results are displayed in table 4. It is actually the first stage of our identification strategy. The table displays different model specifications numbered 1 to 8.[42] In order to have reasonable sample size, we focused on 15 to 21 year-old children. This decision doesn't affect the interpretation of table 4 as the oldest school entry age is 11 in the EBMS data.

[42] This numbering will be used in the second stage of the bivariate probit model (table 5) to indicate which specification has been used in the first stage.

We run a regression of formal school attendance of a child[43] on the number of formal schools which opened before she reached a given age. It controls for school fixed effects a la Chamberlain (1980), (i.e. it controls for the community mean of these variables) so the regression compares the enrollment between different cohorts in each community. The introduction of age dummies controls for the national time trend in school enrollments.

Table 4: Effect of the opening of formal schools on formal school enrollment

	girls				Boys			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of primary or secondary schools which opened before the girl reached 9			0,05 *(0,06)*	0,14* *(0,07)*				
Number of primary or secondary schools which opened before the child reached 10	0,12+ *(0,07)*	0,14 *(0,09)*			0,21* *(0,10)*	0,19 *(0,12)*		
Number of secondary schools which opened before the boy reached 11							0,34* *(0,15)*	0,33* *(0,16)*
Mean of this number in the community	-0,44** *(0,16)*	-0,35** *(0,11)*	-0,27** *(0,10)*	-0,34** *(0,08)*	-0,42** *(0,14)*	-0,40** *(0,13)*	-0,78** *(0,22)*	-0,78** *(0,20)*
Control variables	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1816	1726	1816	1726	1933	1848	1933	1848
log-likelihood	-1020,5	-727,3	-1019,4	-725,7	-749,6	-636,5	-745,9	-635,9

Notes: Probit model. Dependant variable: enrollment in a formal school for at least one year. Robust standard errors clustered by community in parentheses. + significant at 10%; * at 5%; ** at 1%. Control variables: age, wealth, the household's head works in the formal sector, the household's head is farmer, age and ethnic group dummies.

These results show that formal school openings do increase the probability of being sent to one. The effect remains significantly positive after the introduction of cohort effects and the mean number of school openings in the community since an arbitrary date. However the effect is not always significant depending on the model specification: the estimators are rather imprecise. Therefore, the effect of formal school openings on Koranic schooling will also be imprecise, as we will see below.

[43] Attending at least one year of formal school.

Table 5 estimates the effect of formal schooling instrumented by the formal school openings on Koranic schooling. We estimate this effect on all children from 15 to 21, bearing the risk of having boys still enrolled which can alter our estimations.

The simple probit models in columns (a) and (h) basically sums up previous findings already illustrated in figure 3. Hence girls who have been 1 year or more to Koranic school have the same probability of attending formal school as the ones who have never been to Koranic school. The reason is that girls who have been to Koranic school are of two types. On the one hand, those who have been to Koranic school for a short time only and have a high formal school enrollment. On the other hand, those who have followed long Koranic schooling and who were less likely to attend formal school. It can be seen down below in column (a) that the ones who have been for over 5 years to Koranic school are the ones who are the least likely to have attended formal school.

Columns (b), (e), (i) and (l) present bivariate probit models where formal school attendance has been instrumented by the number of formal school openings and its mean in the community, as in model (1) below:

$$\begin{cases} Formal\ school\ access = 1\left(\alpha_1 Nb\,Schools + \alpha_2 \overline{Nb\,Schools}_{community} + X\beta + \varepsilon\right) \\ 1\left(Koranic\ School \geq x\ years\right) = 1(\delta_1 Formal\ school\ access + X\beta + \varepsilon) \end{cases} \quad (1)$$

The instrument is here a measure of the supply of formal education in the community. If this instrument is endogenous due to the fact that schools are more likely to open in some areas that have some specificity in terms of Koranic schooling, then the instrument is not valid.

In these four estimations, the substitution effect between Koranic and formal schooling is stronger than in the simple probit one. For girls, it becomes negative when simple probit estimation gave a zero coefficient, although it is not always significant due to the weak estimation precision. For boys, the coefficient estimations are always negative but much stronger and constant with Koranic school duration, while they were increasing in absolute value in the simple probit model.

Tableau 4: Effet of formal school openings on Koranic schooling, bivariate probit models

		girls						boys						
		a	b	c	d	e	f	g	h	i	j	k	l	m	n
first-step model specifications		Simple Probit	(2)	(1)	(2)	(4)	(3)	(4)	Simple Probit	(6)	(5)	(6)	(8)	(7)	(8)
Formal school effect on the probability of going to Koranic school for:	1 year or more	0,08	-0,82+	-1,09**	0,51	-0,74	-1,06**	0,54	-0,197**	-1,45**	-1,39**	-1,24**	-1,47**	-0,90	-1,18*
		(0,09)	*(0,46)*	*(0,3)*	*(0,43)*	*(0,50)*	*(0,31)*	*(0,43)*	*(0,10)*	*(0,19)*	*(0,32)*	*(0,42)*	*(0,18)*	*(1,91)*	*(0,58)*
	2 years or more	-0,03	-0,98**	-1,15**	0,3	-0,95**	-1,14**	0,36	-0,33**	-1,44**	-1,40**	0,28	-1,37**	-0,59	0,38
		(0,10)	*(0,33)*	*(0,31)*	*(0,46)*	*(0,35)*	*(0,29)*	*(0,46)*	*(0,09)*	*(0,26)*	*(0,38)*	*(1,8)*	*(0,33)*	*(1,46)*	*(1,04)*
	3 years or more	-0,18+	-0,78+	-1,16**	0,43	-0,77+	-1,21**	0,47	-0,59**	-1,60**	-0,98	-0,4	-1,54**	-1,03	-0,26
		(0,10)	*(0,40)*	*(0,49)*	*(0,40)*	*(0,41)*	*(0,38)*	*(0,41)*	*(0,09)*	*(0,19)*	*(0,66)*	*(1,23)*	*(0,25)*	*(1,13)*	*(1,18)*
	4 years or more	-0,29**	-0,63	-0,99	0,57	-0,64	-1,1+	0,59	-0,83**	-1,60**	-0,63	-0,29	-1,58**	0,49	0,06
		(0,09)	*(0,47)*	*(0,92)*	*(0,38)*	*(0,47)*	*(0,66)*	*(0,38)*	*(0,09)*	*(0,24)*	*(1,11)*	*(0,96)*	*(0,27)*	*(1,68)*	*(1,04)*
	5 years or more	-0,32**	-0,69*	-0,37	0,06	-0,69*	-0,68	0,11	-0,94**	-1,60**	-1,26	-0,42	-1,36**	-1,42	-0,27
		(0,10)	*(0,34)*	*(2,35)*	*(-0,34)*	*(0,35)*	*(1,36)*	*(0,34)*	*(0,09)*	*(0,25)*	*(0,91)*	*(0,87)*	*(0,43)*	*(1,26)*	*(1,58)*
The number of school openings is an instrument		No	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
The mean number of school openings in the community is an instrument		No	Yes	No	No	Yes	No	No	No	Yes	No	No	Yes	No	No
Control variables		Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes
Observations		1649	1649	1736	1649	1649	1736	1649	1771	1771	1853	1771	1771	1853	1771

Notes: Bivariate probit models predicting the probability of attending at least one year of formal school on one hand and on the other hand the probability of attending over n years in Koranic school (n between 1 and 5, depending on the line). Only the coefficient of the effect of going to the formal school on the Koranic schooling is displayed. Control variables: age, wealth, the household's head works in the formal sector, the household's head is farmer, age and ethnic group dummies in the simple probit model. The mean number of school openings is always included as an additional explanatory variable in both steps when it is not an instrument. Sample :children over 15 years old. Robust standard errors clustered by community in parenthesis. + significant at 10%; * at 5%; ** at 1%.

Columns (c), (d), (f), (g), (j), (k), (m) and (n) present bivariate probit models where formal school attendance has been instrumented by the number of formal school openings affecting the child only, controlling for the mean number of school openings in the community as in model (2) below:

$$\begin{cases} Formal\ school\ access = 1\left(\alpha_1 Nb\,Schools + \alpha_2 \overline{Nb\,Schools}_{community} + X\beta + \varepsilon\right) \\ 1\left(Koranic\ School \geq x\ years\right) = 1(\delta_1 Formal\ school\ access + \delta_2 \overline{Nb\,Schools}_{community} X\beta + \varepsilon) \end{cases} \quad (2)$$

This time, the estimator is not threatened to be biased by the endogeneity of school opening process. We compare children from the same community before and after school opening. Nevertheless, estimations are way more imprecise. Since a school opening poorly influences school enrollments, there is little information available to estimate the substitution effect.

For both boys and girls it is noticeable that coefficients are often poorly significant. For boys, few coefficients are significantly different from zero. It is the case for the first year of Koranic schooling: they remain significantly negative. Elsewhere the coefficients are usually negative but the imprecision is so important that it is difficult to conclude.

For girls, the coefficient is negative and significant for the three first lines of columns (c) and (f). Nevertheless, in the following columns (d) and (g), the coefficients become insignificant with the introduction of control variables. This should not be the case that control variables affect the coefficients. I.V. estimators should not be affected by the omitted variable bias. One possible explanation is then that there is a selection bias for girls due to early marriages in our sample. Girls get married at younger ages when they haven't been to school, which generates a different selection when a school opens. This difference between boys and girls stems from the fact that boys marry older than girls and they traditionally stay in their parents' home while girls move in their husband's home.[46] Regressions on younger samples were run and are given in the appendix (tables 8 and 9). Results are once again ambiguous. The substitution effect is significantly negative with control variables but non-significant without, even though the introduction of control variables shouldn't affect the coefficient.

[46] Wolof and Haalpulaaren societies (at least) are virilocal.

Overall, the dominant effect seems to be a substitution between Koranic and formal schooling, in particular for boys.

Conclusions

Thanks to a unique Senegalese dataset containing information on both formal and Koranic schoolings in a national household survey, we were able to analyze with scrutiny the link between both schooling institutions away from ideological debates and stereotypes. Indeed mass media tend to focus on Koranic students begging in the streets assimilating them with the plague of street children. However this tends to distort the image of Koranic school which can take many different forms.

In the sample about half of the girls and 60% of the boys attend Koranic school, but the vast majority attends it for 2 to 3 years. Only a third of the boys having attended Koranic schools continued after 3 years and only half of this proportion for girls. The dominance of boys in Koranic school probably reflects the prevalence of men in Islam. Koranic schooling of girls appears to be a more recent phenomenon. This could be linked to women's empowerment in recent years which resulted in higher school attendance for girls in both systems.

When further analyzing the determinants of Koranic schooling, we found the following main results. A wealth effect seems to affect Koranic schooling duration, as for poorer households, the opportunity cost of schooling may be higher as there is a larger child labor demand (mainly for domestic chores). We also found that father's formal education for boys and household head working in the formal sector for girls decreases Koranic school duration. Another important result consistent with the idea that Koranic schooling decisions are embedded in a cultural context is that ethnic group variables represent a strong determinant of both attendance and duration of Koranic education.

More interesting still is the link between both institutions. Simple descriptive statistics show that both systems can indeed coexist. A simple scatter plot reveals an inverted-U shape relation between years of Koranic schooling and formal school enrollment rates. However, these results do not account for the potential correlation between Koranic and formal schooling decisions. Indeed, our I.V. estimation results based on school openings show that substitution effects dominate.

This substitution is somewhat surprising, as the increase in formal school enrolment associated with the opening of a new formal school could increase in part-time Koranic enrolment. So it is probably the case that both kinds of education are not fully differentiated for some Senegalese households. This choice between two different school careers appears to be contradictory with reaching the Millennium Development Goals, as one of them do not provide with the basic capabilities given by primary education.

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Appendix

Table 6: The determinants of years spent in Koranic school for girls, multinomial logit specification

Time spent in Koranic school	1 year	2 years	3 years	4 years	5 years	6 years or more
Rural	-0.754	-0.291	-0.443	0.164	-0.220	-0.155
	*(0.245)***	*(0.272)*	*(0.324)*	*(0.319)*	*(0.403)*	*(0.451)*
Father's Education	0.069	0.093	-0.002	0.001	-0.001	-0.003
	(0.075)	*(0.063)*	*(0.056)*	*(0.073)*	*(0.118)*	*(0.084)*
Mother's Education	0.138	0.025	0.048	0.115	0.020	0.155
	*(0.060)**	*(0.067)*	*(0.081)*	*(0.092)*	*(0.193)*	*(0.116)*
Has ever been enrolled in a formal school	1.088	0.581	0.202	-0.436	0.070	-1.340
	*(0.331)***	*(0.281)**	*(0.404)*	*(0.517)*	*(0.568)*	*(0.474)***
Last grade in formal school	-0.065	-0.042	0.016	0.053	-0.021	0.099
	(0.048)	*(0.038)*	*(0.054)*	*(0.066)*	*(0.080)*	*(0.069)*

Notes: Robust standard errors clustered by community in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. The reference is no Koranic education. Other covariates: age, wealth, the household's head works in the formal sector, the household's head is farmer, ethnic dummies.

Table 7: The determinants of years spent in Koranic school for boys, multinomial logit specification

Time spent in Koranic school	1 year	2 years	3 years or more
Rural	-1.025	-0.163	-0.045
	*(0.423)**	*(0.297)*	*(0.275)*
Father's Education	0.167	0.004	-0.025
	*(0.058)***	*(0.049)*	*(0.039)*
Mother's Education	-0.002	0.033	-0.030
	(0.119)	*(0.079)*	*(0.070)*
Has ever been enrolled in a formal school	1.279	0.663	-0.954
	*(0.453)***	*(0.375)+*	*(0.270)***
Last grade in formal school	-0.074	-0.014	0.038
	(0.041)+	*(0.036)*	*(0.029)*

Notes: Robust standard errors clustered by community in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. The reference is no Koranic education. Other covariates: age, wealth, the household's head works in the formal sector, the household's head is farmer, ethnic dummies.

Table 8: Effect of formal school opening on formal schooling of girls aged between 11 and 14 years old

	girls	
	(1)	(2)
Number of primary schools which opened before the girl reached 11	0,45**	0,588**
	(0,13)	*(0,198)*
Mean of this number in the community	-0,07	0,00
	(0,37)	*(0,40)*
Control variables	No	Yes
Observations	1190	1133
log-likelihood	-572,7	-465,8

Table 5: Effect of formal school openings on Koranic schooling, bivariate probit models: 11 to 14 year-old girls

		girls			
première étape de la régression		Simple Probit	(2)	(1)	(2)
Effect of formal schooling on the probability of attending Koranic school for:	1 year or more	-0,05	-1,44**	-0,27	-1,46**
		(0,14)	*(0,24)*	*(0,98)*	*(0,18)*
	2 years or more	-0,18	-1,67**	0,60	-1,68**
		(0,15)	*(0,12)*	*(0,68)*	*(0,12)*
	3 years or more	-0,35*	-1,80**	0,55	-1,81**
		(0,16)	*(0,23)*	*(0,85)*	*(0,23)*
The number of school openings is an instrument		No	Yes	Yes	Yes
The mean number of school openings in the community is an instrument			Yes	No	No
Control variables		Yes	Yes	No	Yes
Observations		1111	1111	1166	1111

Notes: Bivariate probit models predicting the probability of attending at least one year of formal school on one hand and on the other hand the probability of attending over n years in Koranic school (n between 1 and 3, depending on the line). Only the coefficient of the effect of going to the formal school on the Koranic schooling is displayed. Control variables: age, wealth, the household's head works in the formal sector, the household's head is farmer, age and ethnic group dummies in the simple probit model. The mean number of school openings is always included as an additional explanatory variable in both steps when it is not an instrument. Sample: girls between 11 and 14 years old. Robust standard errors clustered by community in parenthesis. + significant at 10%; * at 5%; ** at 1%.